

Proceedings of the American Academy of Arts and Sciences.

VOL. XXXVII. No. 9. — NOVEMBER, 1901.

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*THE ALGAE OF JAMAICA.*

BY FRANK SHIPLEY COLLINS.



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Presented October 9, 1901. Received October 15, 1901.

THE earliest reference to the algae of Jamaica, and very nearly the earliest reference to the algae of America, appears to be by Sloane;\* in the chapter on submarine plants 43 species are named and described, among which, however, are a few aquatic phanerogams, and a considerable number of corals; of the remainder most are too vaguely described to be now identified, but by the help of the plates, we can give with fair certainty the modern names for four.

Vol. I. p. 57, Pl. XX. Fig. 2, *Corallina opuntiioides, ramulis densioribus, et filis magis sinuatis atque corrugatis*, is *Halimeda Opuntia*. P. 58, Pl. XX. Fig. 3, *Corallina major, nervo crassiore fuciformi, internodia breviora nectente*, White Bead Bandstring *dicta*, is *Cymopolia barbata*. P. 61, Pl. XX. Fig. 9, *Fucus minimus denticulatus triangularis*, is *Bryothamnion triangulare*. P. 58, Pl. XX. Fig. 6, *Fucus marinus vesiculas habens membranis extantibus alatas*, is *Turbinaria trialata*.

P. 58, Pl. XX., *Corallina minima capillacea*, is probably our present *Corallina capillacea*, but neither plate nor description is characteristic enough to make this certain. P. 51, Pl. XVIII., *Corallium album pumilum nostras*, seems to be some species of *Lithothamnion*. The other descriptions are too uncertain to hazard any identifications.

A few algae are mentioned by Browne,† apparently mostly copied from Sloane; some plants undoubtedly belonging to the genus *Sargassum* are mentioned, and from the description of the great floating masses, *S. bacciferum* is undoubtedly meant, but it is probable that other species are included under this name.

Lunan‡ gives seven species of algae, as follows, p. 157-158:

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\* A voyage to the Islands Madera, Barbados, Nieves, S. Christophers and Jamaica, by Hans Sloane, M.D., London, 1707.

† The Civil and Natural History of Jamaica, by Patrick Browne, M.D., 1756.

‡ Hortus Jamaicensis, by John Lunan, 1814.

*Fucus turbinatus* = *Turbinaria trialata*.

“ *natans* = *Sargassum bacciferum*, at least in part.

“ *acinarius*.

“ *vesiculosus*.

“ *triqueter*.

*Ulva pavonia* = *Padina* sp.

“ *Lactuca*.

After this date, except for an occasional reference in some general work, we find nothing until Murray's West India list.\* In this are included references to Sloane and Browne, and several species are added from specimens in the British Museum, collected by Chitty; in a few cases, however, these are species so little to be expected in tropical regions, that it seems as if there must have been some displacement of labels. The total number of Jamaica species mentioned in Murray's list is surprisingly small, if we consider the size of the island, and that it has been so long a comparatively thickly settled English colony. It would be hardly fair to compare it with the Mazé & Schramm Guadeloupe list, † for it is not improbable that half the species in the latter, certainly more than half the new species, will ultimately be relegated to synonymy or to the catalogue of indeterminables. As an instance of this, see the genus *Gracilaria*; 57 species are given by Mazé and Schramm under *Gracilaria* and *Plocaria*; 15 of these are species whose previously known distribution would lead one to expect them in Guadeloupe; of 5, the previous record would make their occurrence here unlikely; the remaining 37 are new species, with scanty description or none at all. Any one at all familiar with *Gracilaria* will recognize what this means.

But as compared with Puerto Rico, for which Hauck's list ‡ gives 92 species against 31 Jamaica species in Murray's list, the disproportion is so great that it might seem as if there must be some special conditions at Jamaica to impoverish the marine flora.

Within the past few years the writer has had the opportunity of examining three collections of algae from this island, that show quite conclusively that this is not the case, and that there is every reason to

\* Catalogue of the Marine Algae of the West Indian Region, by George Murray. *Journal of Botany*, Vol. XXVII. p. 224. 1889.

† *Algues de la Guadeloupe*. 2d Edition. Mazé & Schramm, Basse Terre, 1870-77.

‡ *Meeresalgen von Puerto-Rico*, von F. Hauck. *Engler's Botanische Jahrbücher*, Vol. IX. p. 30, 1888.

suppose that the flora of the island is in no way inferior to similar regions.

The first collection was made by Mrs. Cora E. Pease of Malden, Mass., and her sister, Miss Eloise Butler of Minneapolis, Minn. In July, 1891, they collected at Port Antonio and points in its vicinity; and some collecting was done at other ports, where the steamer touched for a few hours. In 1894 Morant Bay was visited in July, with a visit to Borden and Annotto Bay the first of August, followed by Orange and Hope Bays and Port Antonio, where the greater part of August was spent. In June, 1900, short visits were made to Ora Cabessa, Rio Novo, Runaway Bay, and Rio Bono; June 21 to 27 was spent at Montego Bay; June 29 to July 1 at Kingston; and the time to July 18 was spent at Manchioneal, Port Morant, Hope Bay, Port Antonio, St. Ann's Bay, and Port Maria, in the order named.

The second collection was made by the late Dr. J. E. Humphrey, in March and April, 1893, mostly at or near Kingston, but also near Port Antonio; a few specimens in Dr. Humphrey's herbarium were collected by R. P. Bigelow at Kingston in July, 1891. In 1897 Dr. Humphrey made a second visit to Jamaica; on August 16 he was attacked by the island fever, and died two days later. Among the collections made that year is a large amount of material of shell boring algae, of which he hoped to make a thorough study on his return; unfortunately no one has been able to take up this task, and only such notes as Dr. Humphrey made at the time of collecting have been available for this list.

The third collection, received when this paper was practically ready for publication, was made near Kingston, May 3, 1901, by Dr. J. E. Duerden, who at that time was collecting corals for the Museum at Kingston. By the kindness of Dr. William Fawcett, Director of the Museum, arrangements were made whereby two large cans of algae preserved in formalin were forwarded to the writer. Of the 47 species which were included, six were not represented in the other and larger collections.

In the following list the abbreviation P. & B. has been used for the first named collection, H. for the second; where the specimens had a number in the Humphrey herbarium, the number is given here; notes on station, depth of water, etc., have been copied; and Dr. Duerden's name is given for the third collection. Of one species, not included in either of these collections, I have received specimens from F. Borgesen, collected by O. Hansen.

Many Jamaica algae have been distributed in the two sets of exsiccatae,

Phycotheca Boreali-Americana, issued by Collins, Holden and Setchell, and Phycotheca Universalis, issued by Hauck and Richter: references to these are given under the respective species, with the abbreviations P. B.-A. and P. U., and the numbers.

The Humphrey collection includes 25 fresh water algae, the Pease and Butler collection 9; only two species are common to both. If we compare the marine species\* in these two collections, we find that of the whole number, 215, only 72 occur in both; 143 are found in one and not in the other. A natural inference from this would be that the field was by no means exhausted, and that more species might be expected.

In Murray's list four species are given, which are omitted here: *Gymnogongrus furcellatus*, *Phyllophora Brodiaei*, *Liagora viscida*, and *Plocamium coccineum*, the first on the authority of Wright, the others of Chitty. Probably a misplacement of labels has occurred.

Tables have been prepared, comparing the marine flora of Jamaica with the floras of New England, Great Britain, the northern coast of Spain, the coast of Morocco, the Canary Islands, and Puerto Rico, lists having been published of these regions of sufficient extent to make a comparison of interest.†

Some of these regions having been more thoroughly explored than others, too much importance should not be given to the total number of species in any region; the relative proportion of the different classes is of more weight, while the number of species common to two regions

\* In making up these statistics, named varieties and forms have been counted the same as species.

† The data of these tables are from the following works:—

Preliminary List of New England Marine Algae, by F. S. Collins, *Rhodora*, Vol. II. p. 41, 1900.

A Revised List of the British Marine Algae, by E. M. Holmes and E. A. L. Batters, *Annals of Botany*, Vol. V. p. 63, 1892.

Note Préliminaire sur les Algues Marines du Golfe de Gascogne, par C. Sauvageau, *Journal de Botanique*, Vol. XI, 1897.

Les Algues de P.-K.-A. Schousboe, par E. Bornet, *Memoires de la Société Nationale des Sciences Naturelles de Cherbourg*, Vol. XXVIII. p. 165, 1892.

Plantes Cellulaires des Iles Canaries, par C. Montagne, Paris, 1840.

Crociera del Corsaro alle Isole Madera e Canarie; Alghe, per Antonio Piccone, Genova, 1884.

Contributions à la Flore Algologique des Canaries, par Mlle. A. Vickers, *Annales des Sciences Naturelles*, Series 8, Botany, Vol. IV., 1897.

Meeresalgen von Puerto-Rico, von F. Hauck, *Engler's Botanische Jahrbücher*, Vol. IX. p. 30, 1888.

In addition to the published lists of the Canary Islands, some species have been included from the collection of the author.

indicates the affinities of the floras. The tables are useful merely as showing general tendencies, not exact relations. Exactness would be possible only when the districts compared had been explored and studied to the same extent, with the same care and under the same conditions, a thing practically impossible.

Table No. I. shows the distribution, in the districts named, of each species found in Jamaica; Table No. II. summarizes by classes the total number of species for each of the seven regions, — it represents less the probable richness of each region, than the extent to which it has been explored. A tolerable test of thoroughness of exploration is often found in the proportion which the Schizophyceae bear to the whole number. Being insignificant, usually microscopic plants, they are quite overlooked by the non-scientific collector. Where the knowledge of a region depends on collections made by a non-scientific collector, or by a collector who, however competent in other departments, is not specially an algologist, the red algae constitute a larger, the blue-green a smaller proportion of the whole.

The Puerto Rico collection, and in great part the Canary collection, were made by non-algologists; the Morocco was made by a skilled algologist, but before much was known of the lower algae, or microscopes perfected so that they could be suitably studied. The Biscay collection was the work of one man, a trained algologist, studying the plants on the spot; while the lists for New England and Great Britain cover the most thoroughly studied parts of the world, and the work of generations of botanists. The proportion of Schizophyceae, as shown by Table No. III., follows these conditions fairly well. In the New England list it is exceptionally large, as that list included a number of species, normally fresh water, which were found growing with marine forms, but which usually would not be included in a marine flora. The totals in all parts of the Great Britain list are increased by the fact that in that list the naming of forms is carried out more fully than in any of the others; the percentage, however, is but little affected by this.

It is noticeable that in the first five floras, which might be grouped as warm water floras, the red algae constitute over half the whole list, while in the two northern they are less than half, New England, the most arctic in character though not in latitude, having only 37 per cent. Puerto Rico and Jamaica, the most southern, have the highest percentage of green algae, 27 and 28, respectively, they being in the region of the Siphonaceous plants. The Canaries have less of this element, but more than the region farther north. The low percentage of green algae



in the Biscay region is noticeable, but not easy to account for. The high percentage of brown algae in New England and Great Britain is due to their northern latitude, these plants becoming increasingly prevalent as we go from the equator to the poles; in actual arctic waters they constitute the most conspicuous element of the flora.

Table No. IV. shows the number of species common to the flora of Jamaica and the other floras respectively; No. V. shows the per cent of each class of the Jamaica flora which is found in each of the other floras; No. VI. the per cent of each of the others found in Jamaica. A thoroughly explored country shows a larger per cent in No. V., a smaller per cent in No. VI. than a region less known, but certain general deductions can be made. The Puerto Rican flora is closely allied to the Jamaican, 69 per cent being common to the latter; further exploration would probably increase rather than reduce this. The Canaries come next, and it is noticeable that the percentage in Table No. V. is nearly the same in green, brown, and red algae. In Table VI., which is perhaps the one best showing the relationships, the common elements in the European floras grow regularly less as the distance increases, only 8 per cent of the flora of Great Britain being found in Jamaica.

The Schizophyceae seem to vary least in different regions, the other classes coming, Chlorophyceae, Rhodophyceae, Phaeophyceae, the common per cent of the latter being surprisingly small outside of Puerto Rico and the Canaries.

It is worth noting that Jamaica and the Canaries have 66 species in common, being 30 per cent of the former and 24 per cent of the latter; while New England and Great Britain, at about the same distance, have 258 in common, being 60 per cent for the former, 35 for the latter. This merely illustrates the general rule that beginning almost identical, in the Arctic Ocean, the floras of the two shores of the Atlantic diverge increasingly as we go south. There are, however, a few species common to Jamaica and the Canaries which have not apparently been found on the mainland of either continent; these probably represent an actual communication between the two.

Of the 34 fresh water algae, all but 2 are found in Europe, quite in conformity with the rule that the fresh water algae of the two continents, though separated by salt water, in which they cannot exist, are much more alike than the marine algae, inhabiting the two shores of the Atlantic.



The island of Jamaica is situated in the Caribbean Sea, between lat. 17.40 and 18.30 N. and between long. 76.10 and 78.28 W. from Greenwich. The land vegetation is distinctly tropical in character, though the high land of the interior, and the steady sea breezes of the eastern coast, make the climate more comfortable than might be expected from the latitude. The marine flora is also of a tropical character, as is shown by the number of species of the Dictyotales, and of green algae of the Caulerpaceae, Codiaceae, Valoniaceae, and Dasycladaceae, as also by the absence of any representative of the Laminariaceae. Coral abounds all along the shore, and the coral reefs are often richly overgrown with algae.

The following notes by Mrs. Pease give an idea of the character of the shore and the conditions for collecting algae; occasionally throughout the list that follows similar notes by Mrs. Pease on special localities or forms will be inserted, enclosed, like this, in quotation marks.

"The island of Jamaica is scalloped with beautiful little bays or harbors, and a description of one will apply to nearly all of them. The semi-circular shores of these bays, about which the little villages cluster, are usually low for only a very short distance back from the water; then they rise abruptly into steep hills or mountains. From one to several small rivers empty into each of these bays; the shores are often of 'tufa,' a porous rock, very trying to a pedestrian, but sometimes relieved by little stretches of sandy beach. . . .

"At Port Antonio, which was visited at each of our trips, the harbor is varied by having a small island lying at its entrance, and by a bold point of land running out to break the shore into two little scallops instead of one, one of the bays being barred by a coral reef, the other having a very narrow channel for the entrance of vessels. This reef was the best collecting ground at this place; the water was shallow for quite a distance, and on jagged rocky bottom, the water about waist deep, we found a very luxuriant growth. *Caulerpa clavifera* grew like little clusters of green grapes, in big soggy masses; there were great clumps of the encrusted algae, *Halimeda*, *Amphiroas*, *Galaxauras*, *Cymopolias*, etc.; these continued up towards the shore, and with them upon the rocks were those green, warty, potato-ball-like *Dictyosphaerias*, *Padina*, *Colpomenia sinuosa*, and *Anadyomene stellata*. Still nearer the shore, the water flattened out to nothing, and the bottom was sand, like powdered shell. *Corallina* still grew here, but the others dropped out, and *Caulerpa ericifolia* and *C. plumaris* covered the bottom, as club mosses grow in the woods. We searched here in vain for a long time for *Peni-*

cillus, and only at our last visit I noticed, in water barely deep enough to cover them, peculiar little mounds in the sand; brushing off the tops of these revealed the *Penicillus capitatus*, as abundant as seedling evergreens in a neglected Maine pasture lot. Not far from here, on a stone wall at the edge of a gentleman's garden, the ribbon *Ulva*, *U. fasciata*, streamed out into the water, quite filling it for a distance of about a meter. It grew here, on a very limited area, on each of our visits, but we found it nowhere else on the island. . . .

"Morant Bay is larger, and has a comparatively long stretch of sandy beach, but the surf comes in so heavily that seaweeding is very difficult. Annotto Bay is somewhat unusual, the land for some distance from the sea being low and swampy, with sluggish rivers entering the sea by several mouths, but the sandy pebbly shores retained the usual beautiful curve. Montego Bay has a group of small atolls overgrown with mangrove trees, surrounded with shallow water. Kingston has a fine large harbor, enclosed by a long, narrow, sandy arm. On the outside of this, deep water species were often washed ashore. . . .

"The conditions under which one must collect algae in the tropics are somewhat different from those for collecting in the North, where we have the rise and fall of the tide at intervals of a few hours, alternately laying bare and covering the algae on the rocks. At Jamaica many weeds grow on rocks so situated as to be alternately bared and covered by the wash of the waves at intervals of a few minutes. Many of the *Polysiphonias*, *Gelidium*s, *Gracilarias*, etc., are generally found under these conditions. *Padina* and the *Galaxauras* occur at these stations, but the finest growth of *Padina* that we saw was at Montego Bay, from a road passing over a bluff, directly on the edge of the sea, down into which one could look and see *Padina* growing like a field of gray morning-glory blossoms set upon stones in the shallow, rather quiet water. Near by were patches of *Zonaria variegata*, like red-brown morning glories.

"Much of our collecting was done from boats, rowed by two or three strong, experienced boatmen. We would be rowed out to the shallow places overgrown with grass, the water even there being to our waists, then jump from the boat into the water, and fish about for seaweeds. We always wore bathing suits and boys' thick hip rubber boots. On the reefs or by the ledges the waves were often strong enough to take us off our feet. Then we would cling closely together, one holding on to the other, while the latter plunged for the seaweeds. Even then we would sometimes be washed away from our footing. The boatmen would be busy keeping the boat from the rocks, and stood ready to assist us back

into the boat, often with great difficulty. Most of the Caulerpas were collected in this way, at places some distance from the shore. Even when the plants grew near land, often the shores were so precipitous that one to reach them must use a boat."

In the list that follows, the arrangement practically follows that of Die Natürlichen Pflanzenfamilien of Engler and Prantl, but the names of orders, families, etc., are not given; these are shown later in Table I., giving the comparison of the marine flora of Jamaica with the floras of other regions; the few fresh water algae are included in their appropriate positions in the general list, and the fact of their being fresh water plants is noted by a star prefixed to the name.

#### GENERAL LIST.

*Chroococcus turgidus* (Kuetz.) Naeg. Among various fresh water algae, forming a scum on a small roadside brook at the base of a cliff, near the baths, Bath, July, 1900, P. & B. P. B.-A., No. 751. Among marine algae, near Kingston, Duerden.

\**Gloeocapsa quaternata* (Breb.) Kuetz. Roadside, Bath, July, 1900, P. & B.

*Chrootheca Richteriana* Hansg. Among other algae, in small quantity, Montego Bay, P. & B.

*Xenococcus Schousboei* Thuret. On *Spermothamnion Gorgoneum*, Kingston, July, 1900, P. & B.

\**Oscillatoria anguina* Bory. In still water, Roaring River, near St. Ann's Bay, March, 1893, H.

*O. Corallinae* (Kuetz.) Gomont. In a pellicle on coral rock, Port Antonio, March 27, 1893, H. Among other algae, near Kingston, Duerden.

\**O. formosa* Bory. In still water, Roaring River, near St. Ann's Bay, March, 1893; Castleton, April, 1893, H.

\**O. princeps* Vauch. In mats in stream, St. Ann's Bay, March, 1893, H; Bath, July, 1900, P. & B.

\**O. princeps forma purpurea* n. f. Trichomes and stratum a bright purple, otherwise like type. Forming a stratum on a roadside brook, near the baths, July, 1900, P. & B. P. B.-A., No. 753.

\**O. proboscidea* Gomont. In a pool by "Wag Water," and in stream from reservoir, Castleton, April, 1893, H.

\**O. tenuis* Ag. In company with *O. princeps forma purpurea*, Bath, July, 1900, P. & B.

\**Phormidium Retzii* (Ag.) Gomont. In tufts on plants, Rio Cobre, Bog Walk, April, 1893, H.

*Lyngbya aestuarii* (Mert.) Liebm. In mats on stones, Kingston, April, 1893, H; Port Antonio, July, 1891, P. & B. Near Kingston, Duerden.

*L. confervoides forma violacea* n. f. In company with *L. majuscula*, Manchioneal Bay, July, 1900, P. & B. Differing from the type only in color.

*L. majuscula* Harv. Forming a film on marine algae, Port Antonio, March, 1893, H. Same locality, July, 1891, P. & B. Forming extensive tufts on muddy bottom, near the mouth of a small stream, Manchioneal Bay, July, 1900, P. & B.

\**L. putalis* Mont. Morant Bay, July, 1900, P. & B.

\**L. versicolor* (Wartm.) Gomont. Marine Garden, Kingston, H. P. B.-A., No. 54.

*Symploca hydroides* Kuetz. var. *genuina* Gomont. On rocks in shallow water, in small patches, not abundant, Montego Bay and Manchioneal Bay, 1900, P. & B.

*S. hydroides* var. *fasciculata* (Kuetz.) Gomont. With var. *genuina*, P. & B.

\**Plectonema Nostocorum* Bornet. Among *Gloeocapsa quaternata*, Bath, July, 1900, P. & B.

\**P. Wollei* Farlow. Morant Bay, Aug., 1894, P. & B. Roaring River, H. P. B.-A., No. 55.

\**Schizothrix coriacea* (Kuetz.) Gomont. In tufts on sides of lily tanks, Botanic Garden, Castleton, April, 1893, H.

\**S. Mexicana* Gomont. On rock in "Wag Water," Castleton, April, 1893, No. 399, H.

*Microcoleus chthonoplastes* (Fl. Dan.) Thuret. In turfs of algae, St. Ann's Bay, March, 1893, H.

*M. tenerrimus* Gomont. In company with *M. chthonoplastes*, March, 1893, H.

\**M. vaginatus* (Vauch.) Gomont. On moist rock, Rio Cobre, Bog Walk, April, 1893, H.

\**Nostoc commune* Vauch. In crusts on sandy soil, Constant Spring, April, 1893, No. 365, H.

\**N. microscopicum* Carm. On steps into reservoir, Constant Spring, April, 1893, No. 361, H. The specimens are sterile, so that the determination is somewhat in doubt.

\**N. verrucosum* Vauch. On rocks in "Wag Water," Castleton, April, 1893, H. No. 362, H., from trough in running water, Castleton, April, 1893, is probably the same species.

\**Cylindrospermum muscicola* Kuetz. On sides of basin, Constant

Spring; on sand at edge of river, Castleton, April, 1893, No. 364, H.

*Hormothamnion enteromorphoides* Grunow. In shallow water, St. Ann's Bay; on coral reef, Navy Island, July 25, 1897, H. P. B.-A., No. 56. Near Kingston, Duerden.

\**Scytonema Arcangelii* Born. & Flah. On moist rocks by spring, Castleton, April, 1893, H.

*S. conchophilum* Humphrey ms. In old conch shell, Port Antonio, March, 1893, H. Kingston, June, 1897, H; Producing slight, gray, pustular roughenings of outside of shell, *Mastigocoleus testarum* occurring on inside of same shell.

Filaments 5–8  $\mu$  diam., irregularly branched, branches single or geminate, tips rounded, cells two thirds to two times as long as broad, 2.7–4.5  $\mu$  diam., pale bluish when separate. Heterocysts globose or slightly elongated, 5  $\mu$  diam., rarely two or three together, intercalary. Sheath rather thin, deep yellow, homogeneous; when old, rough outside, hyaline and thin at growing tips. J. E. Humphrey.

\**S. crispum* (Ag.) Bornet. On sides of trough, Constant Spring; in basin, Kingston, April, 1893, H. P. B.-A., No. 60.

\**S. densus* (A. Br.) Bornet. In turfs, moist places, Port Antonio, April, 1893, H.

\**S. Hofmanni* Ag. On steps of Court House, Port Antonio, April, 1893, H.

\**S. Javanicum* (Kuetz.) Bornet. On flower-pot in garden, Castleton, April, 1893, H.

\**S. ocellatum* (Dillw.) Thuret. On old palm stems, Castleton, April, 1893, H.

\**Hapalosiphon fontinalis* (Ag.) Bornet. On rock, "Wag Water," Castleton, April, 1893, H.

*Mastigocoleus testarum* Lagerh. In old shells, Kingston, 1897, H.

*Calothrix aeruginea* (Kuetz.) Thuret. On *Dasya arbuscula*, Montego Bay, June, 1900, P. & B.

*C. confervicola* (Roth) Ag. On various algae, Port Antonio, March, 1893, H.

*C. Contarenii* (Zan.) Born. & Flah. On wreck on beach, Port Morant, March, 1893, H.

\**C. fusca* (Kuetz.) Born. & Flah. Among *Gloeocapsa quaternata*, Bath, 1900, P. & B.

\**C. Juliana* (Meneg.) Born. & Flah. On stones in stream, Roaring River, St. Ann's Bay, March, 1893, H.

*C. pilosa* Harv. On *Bostrychia tenella*, Port Antonio, Aug., 1894, P. & B.

*Dichothrix penicillata* Zan. On *Cymopolia barbata*, Port Maria, H. On *Dictyota dichotoma*, P. & B. P. B.-A., No. 62.

\**Gloeotrichia natans* (Hedw.) Rab. Under *Nymphaea* leaves, Botanic Garden, Castleton, April, 1893, H.

\**Spirogyra decimina* (Muell.) Kuetz. Manchioneal, July, 1900, P. & B.

The spores agree with this species, and as far as can be judged from dried specimens, the vegetative characters. A sterile *Spirogyra* from Bath has the same dimensions of cells, but cannot be specifically determined.

*Ulva fasciata* Delile. In dense masses just below water mark, but only in one limited locality, Port Antonio, July, 1891, P. & B. P. B.-A., No. 221. Near Kingston, Duerden.

*U. Lactuca* var. *rigida* (Ag.) Le Jolis. Port Antonio, Aug., 1894; Kingston, Montego Bay, June, 1900, P. & B. Near Kingston, Duerden.

*Enteromorpha erecta* (Lyng.) J. Ag. Port Antonio, April, 1892, P. & B.

*E. flexuosa* (Wulf.) J. Ag. Port Antonio, July, 1891; Runaway Bay, July, 1900; washed ashore, Manchioneal Bay, July, 1900, P. & B. Near Kingston, Duerden.

*E. intestinalis* (L.) Link. Port Antonio, washed ashore, July, 1894, P. & B.

*E. prolifera* (Muell.) J. Ag. Runaway Bay, Montego Bay, Manchioneal, on stones; also in fresh water at Bath, on stones in river, 1900, P. & B.

\**Stigeoclonium tenue* (Ag.) Rab. No. 366, H., locality not given.

*Diplochaete solitaria* n. g. & sp. Frond epiphytic, consisting of a single cell, with thick, transparent wall, and bright green contents, spherical or flattened, the outline as seen from above round or slightly oval; two hairs arising from each cell, usually opposite, and from points on the under surface quite near the edge. Cell 25-30 $\mu$  diameter, half this diameter being occupied by the wall; hairs 4-6 $\mu$  diameter, slightly tapering, straight. On *Laurencia obtusa*, near Kingston, Duerden.

This minute plant was observed on a specimen of *Laurencia*, after it had been mounted for the herbarium, so that nothing is known as to its development, but it seems so distinct from any described genus of the *Chaetophoraceae* as to require a new name.



*Pringsheimia scutata* Reinke. On *Laurencia obtusa*, near Kingston, Duerden.

\**Mycoides parasitica* Cunningham. On leaves of various plants, Roaring River, March, 1893, Nos. 324 & 325; Bath, 1897, H. P. B.-A., No. 763.

*Chaetomorpha brachygona* Harv. Port Antonio, July, 1891; Manchioneal Bay, Rio Bono, 1900, P. & B. Forming dense mats on bottom of Kingston Harbor, April, 1893, No. 369, H. Near Kingston, Duerden. Hardly distinct from *C. cannabina* of Europe.

*C. clavata* (Ag.) Kuetz. Washed ashore, Port Antonio, P. & B. St. Ann's Bay, March, 1893, No. 329, H. A rather slender form.

*C. aerea* (Dillw.) Kuetz. Washed ashore, Port Antonio, Aug., 1894, P. & B.

*C. Linum* (Fl. Dan.) Kuetz. Kingston Harbor, Aug., 1891, R. P. Bigelow. Manchioneal, in company with *C. brachygona*, Morant Bay, June, 1900, P. & B.

The plant from Morant Bay has very moniliform filaments, up to .4 mm. diameter, the cell wall thin, color light green, articulations one to two diameters; perhaps a distinct species.

*C. Linum* var. *brachyarthro* Kuetz. Port Antonio, July, 1891, P. & B.

*C. Melagonium* (Web. & Mohr.) Kuetz.? Growing in mud near the mouth of a river, Manchioneal, July, 1900, P. & B. Quite like the northern form usually known as *C. Picquotiana*, but possibly not distinct from *C. Linum*.

*Cladophora fascicularis* Kuetz. Port Antonio, July, 1891; Montego Bay, Manchioneal, 1900, P. & B.; Port Antonio, Feb., 1893, No. 179, H. Generally distributed, usually growing on pebbles in mud in shallow water.

*C. crystallina* (Roth) Kuetz. Ora Cabessa, June, 1900, P. & B.

*C. fuliginosa* Kuetz. In turfs, Port Maria, No. 298, H. Morant Bay, Annotto Bay, etc., P. & B. Apparently common everywhere; usually known as *Blodgettia confervoides*.

*C. Hutchinsiae* (Dillw.) Kuetz. Port Antonio, July, 1891, P. & B.

*C. intertextata* n. sp. Filaments 200–350 $\mu$  diam., articulations one to three diameters, usually one and one half to two; sparingly branched, branches naked or with short, usually secund ramuli; terminal cells blunt, rounded. Tufts densely matted, prostrate.

The plant forms dense masses on the bottom of pools, creeping over the coral sand and broken shells; the upright branches are usually simple, and the plant resembles an entangled mass of some coarse *Chaeto-*



morpha rather than a *Cladophora*, but occasionally the free branches have a series of second, two or three-celled ramuli, issuing one from each articulation. In the entangled mass more branching of this character will be found, also long normal branches in no definite order. The habit of *C. intertexta* is much like that of *C. repens* (J. Ag.) Harv., but the filaments are two or three times as large as in that species, and the color is a light green, somewhat whitish in drying, instead of the dull olive green of *C. repens*; the latter has, moreover, a vaguely dichotomous branching, and articulations many times—according to Harvey, even twenty times—the diameter. *C. herpestica* (Mont.) Kuetz. has filaments of about the same size as *C. intertexta*, but it has long articulations, up to fifteen diameters, and irregular branching, with the upper branches fasciculate.

Found along the shore near Manchioneal, July, 1900, P. & B. P. B.-A., No. 818.

*C. trichocoma* Kuetz. Manchioneal, July, 1900, P. & B.

*Gomontia polyrhiza* (Lagerh.) Born. & Flah. In old shells, coral and bones, Kingston, 1897, H.

*Bryopsis Harveyana* J. Ag. In tufts on stones, Kingston Harbor, April, 1893, No. 367, H.

*B. pennata* Lamour. In tufts on rocks, Apostles' Battery, Kingston Harbor, April, 1893; Port Maria, March, 1893, No. 297, H. A single specimen, Port Morant, July, 1900, P. & B.

*Caulerpa cupressoides* var. *typica* Weber. On sandy bottom, Navy Island, Port Antonio, March, 1893, No. 188, H.; Port Antonio, P. & B. P. B.-A., No. 79.

*C. cupressoides* var. *Turneri* Weber. Port Antonio, P. & B. P. B.-A., No. 765.

*C. cupressoides* var. *mamillosa* (Mont.) Weber. Among eel-grass, at about one meter depth, Montego Bay, July, 1900, P. & B. Including forma *typica* and forma *nuda*. P. B.-A. No. 765. Near Kingston, Duerden.

*C. cupressoides* var. *ericifolia* (Turn.) Weber. Port Antonio, July, 1891, P. & B.

*C. pinnata* forma *Mexicana* (Sond.) Weber. Montego Bay, July, 1900, P. & B.

*C. plumaris* forma *longiseta* (J. Ag.) Weber. Forming dense mats in mud in shallow water, Port Antonio, July, 1891, P. & B. P. B.-A., No. 27. Near Kingston, Duerden; very luxuriant, the erect fronds 20 cm. high.

*C. plumaris* forma *brevipes* (J. Ag.) Weber. Port Antonio, July, 1891; Montego Bay, July, 1900, among eel-grass at about one meter depth, P. & B. P. B.-A., No. 766. P. U., No. 672. Near Kingston, Duerden.

*C. prolifera* (Forsk.) Lamour. Washed ashore, not common, Port Morant, July, 1900, P. & B.

*C. racemosa* var. *clavifera* (Turn.) Ag. Port Antonio; Port Morant, at about one meter depth, July, 1900, P. & B. In tufts on rocks, Kingston, April 8, 1893, No. 370, H. P. B.-A., No. 767.

*C. racemosa* var. *clavifera* forma *macrophysa* (Kuetz.) Weber. On coral reef, Port Antonio, 1894 & 1900, P. & B. Near Kingston, Duerden, passing insensibly into var. *clavifera*. P. B.-A., No. 870.

*C. taxifolia* (Vahl) Ag. Washed ashore, Port Morant, July, 1900. Annotto Bay, 1894, P. & B. Chitty. P. B.-A., No. 768.

*C. verticillata* J. Ag. In tufts on coral rocks, Port Antonio, Feb. 27, 1893, No. 181, H. Near Kingston, Duerden.

*C. verticillata* forma *charoides* (Harv.) Weber. Kingston, June, 1900, P. & B. Forming fine moss-like mats in soft mud near Mangrove swamp, at depth of about one meter. Near Kingston, Duerden.

*Penicillus capitatus* Lam. Port Antonio, Montego Bay, Manchioneal, nearly buried in coral sand, 1900, P. & B. Port Maria, No. 294, H. Sloane. P. B.-A., No. 271. P. U., No. 523. Near Kingston, Duerden.

*P. dumetosus* (Lamour.) Decsne. Annotto Bay, washed ashore, Manchioneal, July, 1900, P. & B. Specimen without locality, H. P. B.-A., No. 769.

"*Penicillus dumetosus* grew in some abundance in a pool near Manchioneal. The pool was narrow, with precipitous tufa walls, which towards the sea closed over the pool in an arch, through which the waves broke heavily. The *Penicillus* grew among eel-grass, in muddy soil, covered by a coating of powdered shell and coral. With it were *P. capitatus*, *Avrainvillea longicaulis*, and *Halimeda*. The *P. dumetosus* looked like miniature groves of carefully trimmed evergreen trees, gray green in color."

*Rhipocephalus Phoenix* (Ell. & Sol.) Kuetz. Port Morant, a single specimen washed ashore, July, 1900, P. & B.

*Avrainvillea longicaulis* (Kuetz.) Murray & Boodle. Montego Bay, June, Manchioneal, July, 1900, P. & B. P. B.-A., No. 770.

*Avrainvillea nigricans* Decsne. Singly in shallows, Port Maria, March 17, 1893, No. 270, H. Manchioneal, July, 1900, P. & B. P. B.-A., No. 771.

"*Avrainvillea longicaulis* at Montego Bay grew imbedded in mud among eel-grass in shallow water, near a small island consisting of mangrove swamp. It was discovered by the sense of feeling as we were dredging in the mud among the eel-grass roots for *Caulerpa*. We were continually feeling through the thick soles of our rubber boots a sensation as of stepping on drowned kittens. It proved to be the curious fleshy fronds of *Avrainvillea*, somewhat resembling a downy, dirty, swollen *Udotea*, often full of worms and other small animals. *Avrainvillea* grew also at Manchioneal, in an enclosed salt water pool, in eel-grass with *Penicillus dumetosus*, rooted in a clean bottom of powdered shells and coral; but on the rocks bordering the pool was another species, *A. nigricans*, with short stems, and tops not so flabellate, resembling in shape our stemmed puff-balls."

*Udotea conglutinata* (Sol.) Lamour. Closely set on bottom, Port Maria, March 17, 1893, No. 269, H.

*U. flabellata* Lamour. On sandy bottom, Port Antonio, March 3, 1893, No. 202; Port Maria, March 17, 1893, No. 268, H. On muddy bottom, Port Antonio, July, 1894; washed ashore, Morant Bay, P. & B.

*Halimeda Opuntia* (L.) Lamour. In dense tufts, Port Maria, March, 1893, H. Port Antonio, July, 1891, P. & B. Near Kingston, Duerden. Sloane. Growing similarly to the preceding species.

*H. tridens* (Ell. & Sol.) Lamour. In tufts, St. Ann's Bay, March 23, 1893; Port Maria, March 17, 1893, H. Port Antonio, July, 1891, growing in shallow water, in soil composed of broken shells and coral. Near Kingston, Duerden.

It is impossible to distinguish *H. incrassata* (Ell.) Lamour from *H. tridens*. In any considerable collection typical forms of each and a series of intermediate forms are to be found.

*H. Tuna* (Ell. & Sol.) Lamour. In dense tufts, shallows, Port Antonio, March 10, 1893, No. 235, H.

*Codium adhaerens* (Cabr.) Ag. Port Antonio, Aug., 1894, P. & B. Specimen without locality, No. 293, H.

*C. tomentosum* (Huds.) Stack. In immense tufts, Port Maria, March 17, 1893, No. 266, H. Port Antonio, July, 1891; Kingston, July, 1900, P. & B. Near Kingston, Duerden. Washed ashore in large quantities, nearly everywhere. P. B.-A., No. 168.

*Valonia aegagropila* Ag. On rocks in shallows, Port Maria, March 20, 1893, No. 296, H. Montego Bay, July, 1900, on rocks in shallow water, P. & B. P. B.-A., No. 772.

*V. ventricosa* J. Ag. On rocks in shallows, Port Antonio, March 11,

1893; Port Maria, March 20, 1893, No. 295, H. On rocks in shallow rough water, Montego Bay, June, 1900, P. & B. "Fronds smooth and transparent, as if made of thin green glass."

*V. verticillata* Kuetz. On rocks in shallow water, Port Morant, Manchioneal, July, 1900, P. & B.

*Siphonocladus membranaceus* (Ag.) Bornet. Growing in mats on rocks, near shore, Port Antonio, Aug., 1894; Runaway Bay, June, 1900, P. & B. Near Kingston, Duerden.

*S. tropicus* (Crouan) J. Ag. Washed ashore, Morant Bay, July, 1894, P. & B.

*Dictyosphaeria favulosa* (Ag.) Decsne. On rocks in shallows, Port Antonio, March 3, 1893, Nos. 205 & 271, H. On coral reef, Port Antonio, July, 1891, P. & B. P. B.-A., No. 124.

*Chamaedoris annulata* (Lam.) Mont. Washed ashore, Morant Bay, July, 1894, P. & B.

*Microdictyon umbilicatum* (Vellay) Zan. In dense tufts, Port Antonio, Feb. 27, 1893, No. 174, H.

*Anadyomene stellata* (Wulf.) Ag. In tufts on rocks, Port Antonio, Feb. 27, 1893, H. Similar localities, Port Antonio, July, 1891; Kingston, Port Morant, July, 1900, P. & B. P. B.-A., No. 169.

*Acetabularia crenulata* Lamour. Port Antonio, Annotto Bay, Aug., 1894; Rio Novo, June, 1900, P. & B. Near Kingston, Duerden. P. B.-A., No. 125.

"At Annotto Bay *Acetabularia* and *Dasycladus* grew in water nearly to our shoulders, not very rough, on cobble stones, the two species growing together like minute forests covering the stones."

*Dasycladus clavaeformis* (Roth) Ag. In tufts on rocks, Port Maria, Apr. 19, 1893, No. 285, H; Annotto Bay, with the preceding species; on pebbles washed ashore, St. Ann's Bay, 1900, P. & B. P. B.-A., No. 170.

*Botryophora occidentalis* (Harv.) J. Ag. In salt pools, Palisadoes, Kingston Harbor, April 10, 1893, No. 386, H. Port Antonio, Aug., 1894, P. & B.

*Neomeris dumetosa* Lamour. Kingston Harbor, on mangrove roots, July, 1900, P. & B. "Looking like small green worms."

*Cymopolia barbata* (L.) Lamour. In tufts on stones, St. Ann's Bay and Port Maria, March, 1893, H. On coral reef, Port Antonio, Annotto Bay, 1891 & 1894, washed ashore; Kingston, Port Morant, 1900, P. & B. Near Kingston, Duerden. P. B.-A., No. 28. P. U., No. 674. Sloane.

Many specimens agree with the description of *C. Mexicana* J. Ag., but all intermediate forms occur, and often the same individual will agree with one species in one part of the frond, with the other in other parts.

*E. Mitchellae* Harv. ? Kingston, March, 1893, Nos. 141, 142, 372, H. Not exactly like the type of this species, the plurilocular sporangia being longer and sometimes clavate. Possibly *E. Duchassaingianus* Grunow.

*Striaria attenuata* (Ag.) Grev. Montego Bay, June, 1900, washed ashore on sandy beach, P. & B.

*S. attenuata* var. *ramosissima* (Kuetz.) Hauck. With the type, June, 1900, P. & B.

*Colpomenia sinuosa* (Roth) Derb. & Sol. On coral rocks, Port Antonio, March 8 and 23, 1893, Nos. 153 and 212; Port Maria, March 17, 1893, No. 273, H. Annotto Bay to Port Antonio, in shallow water, Aug., 1894, P. & B.

*Hydroclathrus cancellatus* Bory. On coral rocks, Port Antonio, Feb. 10, 1893, No. 234, H.

*Cutleria* sp. A single specimen, attached to a frond of *Udotea flabelata*, seems to be the *Aglaozonia* form of some *Cutleria*, but in the absence of fruit it is indeterminable. The frond consists of radiating articulate filaments, united laterally, and varying much in diameter.

*Turbinaria trialata* Kuetz. Washed ashore, Port Antonio, March 8, 1893, No. 211; in tide pools, Port Maria, March 16, 1893, No. 249, H. Washed ashore, Port Antonio, July, 1891; Montego Bay, July, 1900, P. & B. P. B.-A., No. 774. *T. vulgare*, Sloane, is undoubtedly this species.

*Sargassum bacciferum* (Turn.) Ag. Washed ashore, Port Maria, March 18, No. 248, H. Sloane, Chitty.

*S. lendigerum* (L.) Kuetz. Washed ashore, Port Antonio, July, 1891, P. & B. In tufts in tide pools, Port Maria, March 17, 1893, No. 292, H.

*S. platycarpum* Mont. Washed ashore, Port Antonio, July, 1891, P. & B. Same locality, March 8, 1893, No. 210, H. P. B.-A., No. 775.

*S. vulgare* Ag. Washed ashore, Port Maria, March 18, 1893, No. 247, H. The references to Sloane and Chitty are doubtful, and some other form may have been referred to under this name.

*S. vulgare forma ovata* n. f. Washed ashore, Montego Bay, June, 1900, P. & B. P. B.-A., No. 776. Leaves thick, dark, ovate to suborbiculate, coarsely and sharply, sometimes doubly toothed, usually slightly oblique at the base. The branching is dense, the leaves numerous and

of form and thickness mentioned above; otherwise it agrees with typical *S. vulgare*.

*S. vulgare* var. *foliosissimum* (Lamour.) J. Ag. Washed ashore, Port Antonio, July, 1891, P. & B.

*Spatoglossum Schroederi* (Mert.) J. Ag. Two specimens only, washed ashore on sandy beach with high surf, near lighthouse, Kingston harbor, July, 1900, P. & B. Chitty.

*Stypopodium lobatum* (Ag.) Kuetz. Washed ashore, Port Maria, March 10 and 19, Nos. 231 and 286; St. Ann's Bay, March 23, 1893, No. 311, H. Annotto Bay, July, 1891; Montego Bay, June, 1900, P. & B. P. B.-A., No. 777.

"*Stypopodium lobatum* grew in magnificent clumps of two sorts, one with the frond narrowly divided and heavily marked with dark bars, making the plant resemble bunches of turkey feathers; the other with fronds of broader divisions and not so prominently barred. The first mentioned form grew deeper down in the water, so deep as to have to be pulled off by the boatmen by means of a long handled boat-hook. The two forms were plainly distinguished as they grew in the water."

*Gymnosorus variegatus* (Lamour.) J. Ag. Kingston, Montego Bay, 1900, P. & B. P. B.-A., No. 778.

"*Gymnosorus variegatus* grew with *Padina*, which it resembled in manner of growth, being in shape like clusters of short-stemmed morning glory flowers. It formed a covering to the rocks nearer shore than the *Stypopodium*, the water being about knee deep. *G. variegatus* is reddish brown in color, *Padina* gray, *Sargassum* and *Turbinaria* rich yellow brown; *Dictyota* a darker brown with less yellow; *Stypopodium* generally grayish brown with dark markings. The contrasting colors were very rich in the water."

*Padina Durvillaei* Bory. On rocks, Port Antonio, Feb. 28, 1893, No. 173, H. Port Antonio, July, 1891; Ora Cabessa, Montego Bay, 1900, P. & B. Near Kingston, Duerden. The *P. Pavonia* of Murray and earlier lists is probably this species.

*Dictyopteris delicatula* Lamour. In tufts on rocks, Port Maria, March 19, 1893, H. Washed ashore, Annotto Bay, Aug., 1894; Hope Bay, Kingston, 1900, P. & B. P. B.-A., No. 485.

*D. Justii* Lamour. Washed ashore, Port Antonio, July, 1891; Morant Bay, Annotto Bay, Aug., 1894; Kingston, 1900, P. & B. In tufts on rocks, Port Maria, March 17, 1893, No. 264, H. Chitty.

*D. plagiogramma* Mont. Annotto Bay, July, 1894, washed ashore, P. & B. Chitty.



*Dictyota Bartayresiana* Lamour. Washed ashore in mats, Port Antonio, March, 1893, Nos. 154, 194, 229, H. Port Antonio, July, 1891; on rocks in shallow water, Kingston, Montego Bay, Manchioneal, 1900, P. & B. Near Kingston, Duerden. P. B.-A., No. 579. Found in both broad and narrow forms, at nearly all the localities, often appearing like two distinct species.

*D. cervicornis* Kuetz. Washed ashore, Port Antonio, Aug., 1894, P. & B. Near Kingston, Duerden.

*D. ciliata* Ag. In tufts on rocks, Port Maria, March 16, 1893, Nos. 246 and 287; Port Antonio, March 10, 1893, No. 230, H. Washed ashore, Montego Bay, Ora Cabessa, Manchioneal, 1900, P. & B. P. B.-A., No. 779. All three kinds of fruit are represented in the specimens distributed in the *Phycotheca Boreali-Americana*, the plants being collected at the same time. All are similarly arranged, occupying the whole of the fertile segments, except a narrow strip at the margin. The male plants are mostly old and battered, as if the antheridia were produced somewhat earlier in the season than the other kinds of fruit.

"*Dictyota ciliata* at Montego Bay, June 23, 1900, grew on boulders near a precipitous rocky shore in water more than waist deep. It formed large round clumps. The water being very clear here, the hairs on the edge of the frond were so conspicuous as to easily distinguish in the water this form from other *Dictyotas*. The rocks in this locality were beautifully draped with the *Dictyota*, robust plants of *Turbinaria* in large thick masses, a *Sargassum* with rounded leaves, and *Stypopodium* in magnificent clumps."

*D. dentata* Lamour. Washed ashore, Port Maria, March 17, 1893, No. 265, H. Port Antonio, July, 1891, P. & B. On rocks in rough water, one meter or more deep. P. U., No. 669. Some specimens have the tips of the branches so finely divided as to seem ciliate.

*D. dichotoma* (Huds.) Lamour. Kingston Harbor, July, 1891, R. P. Bigelow. On rocks, Port Antonio, July, 1891; Montego Bay, June, 1900, P. & B. Chitty.

*D. divaricata* Lamour. In various places, 1900, P. & B. Near Kingston, Duerden. Connected by intermediate forms with *D. Bartayresiana*.

*D. fasciola* (Roth) Lamour. Washed ashore, Port Antonio, July, 1891; Rio Novo, June, 1900, P. & B.

*Dilophus alternans* J. Ag. Port Antonio, July, 1894, P. & B.

*D. Guineensis* (Kuetz.) J. Ag. On flat rocks washed by the waves, in company with *Gelidium rigidum*, Montego Bay, Rio Novo, June, 1900, P. & B.



*Dictyerpa Jamaicensis* n. g. & sp. Frond filiform, 1-3 mm. diam. up to 2 dm. long; consisting of two layers of cells, an inner layer of large, colorless, cylindrical cells, about three diameters long, symmetrically arranged; an external monostromatic layer of brown rectangular cells from one to three diameters long, in distinct longitudinal series. Branching di- or trichotomous, with occasional irregularly placed lateral branches, mostly at wide angles, each branch ending in a large, depressed-hemispherical cell, by whose division the growth of the branch proceeds. Tufts of very fine, rust-colored or colorless confervoid rhizoidal filaments at irregular intervals on the frond. Fructification? Washed ashore, Manchioneal, July, 1900. P. B.-A., No. 780.

Though evidently belonging to the Dictyotaceae, this plant differs from any genus of the family yet described, in having the frond terete throughout. Many Dictyotaceae have prostrate rooting filaments from which the erect fronds arise, but in all species found in Jamaica this prostrate growth is quite insignificant in comparison with the plant in question. It was found washed ashore in two places, in considerable quantity, and in no case shows any indication of fructification, or of producing erect flattened fronds. It may seem hazardous to give it a generic name, but as it is a plant of quite distinct habit, and cannot be now identified with any named form, it seems to require at least a provisional name.

As washed up on the beach, it appeared like rolled and twisted strings. The dried plant is quite black in color, and under a hand lens shows closely set constrictions, probably due to the large interior cells being of uniform length, and terminating at the same level, as in the frond of *Polysiphonia*. These constrictions are lost when the frond is remoistened.

*Goniotrichum Humphreyi* Collins. On woodwork of wreck, St. Ann's Bay, March 24, 1893, No. 316, H. P. B.-A., No. 421.

"Frond filamentous, solid, gelatinous, occasionally forking or dividing into several branches, the terminal portion consisting of a single series of cells; the older part containing numerous cells, irregularly placed near the surface of the filament; lateral branches abundant, simple, issuing nearly at a right angle, composed of a single series of cells." This description is copied from the label of P. B.-A., No. 421.

*G. elegans* (Chauv.) Le Jolis. Among other algae, on *Laurencia obtusa*, near Kingston, Duerden.

*Chantransia Saviana* (Menegh.) Ardiss. Among other algae, on *Laurencia obtusa*, near Kingston, Duerden.

*Liagora Cheyneana* Harv. Washed ashore, Port Maria, March 17, 1893, No. 281; Port Antonio, March, 1893, No. 186, H.

*L. decussata* Mont. Washed ashore, Hope Bay, July, 1891, and Aug., 1894, P. & B. Very abundant in 1894. P. B.-A., No. 89. The finest species of the genus, with fronds in shape of a fir tree, sometimes over a meter in length. Apparently confined to the islands on the two sides of the Atlantic.

*L. elongata* Zan. Hope Bay, July, 1891; Montego Bay, July, 1900, P. & B.

*L. pulverulenta* Ag. Washed ashore, Manchioneal, July, 1900, P. & B.

*L. valida* Harv. In large tufts, Port Maria, March 17, 1893, No. 283; Port Antonio, March 10, 1893, No. 240, H. Hope Bay, Orange Bay, Montego Bay, 1891 and 1900, P. & B. Under No. 687, P. B.-A., a form was distributed as *L. tenuis*, which it now seems better to regard as *L. valida*. It is difficult to see how the two species can be distinguished, when one has a large number of specimens. Harvey's name, being the older, must be maintained.

*Galaxaura cylindrica* (Sol.) Decsne. Port Antonio, Morant Bay, Manchioneal and elsewhere, common, P. & B. Near Kingston, Duerden. Sloane. Chitty. P. B.-A., No. 134.

*G. lapidescens* (Sol.) Lamour. In large tufts, Port Antonio, March 10, 1893, No. 239, H. Annotto Bay, Port Antonio, July, 1891; Montego Bay, on rocks, June, 1900, P. & B. Chitty. Not so common as other species of the genus.

*G. marginata* (Ell. & Sol.) Lamour. On stones at tide-mark, Port Antonio, March 10, No. 145; March 21, No. 241, H. Port Antonio, Annotto Bay, Montego Bay, Manchioneal, 1900, P. & B. Common, growing very densely on rocks.

*G. obtusata* (Ell. & Sol.) Lamour. Port Antonio, July, 1891; Port Maria, July, 1900, P. & B., in company with other species of the genus.

*G. rugosa* (Sol.) Lamour. In large tufts, Port Antonio, March, 1893, No. 131, H. Port Antonio, July, 1891; Rio Novo, Rio Bono, Montego Bay, 1900, P. & B. Near Kingston, Duerden. P. B.-A., No. 133. P. U., No. 510. Sloane. Usually washed ashore on beaches.

*Wrangelia Argus* Mont. Montego Bay, June, 1900, forming soft mats on rocks, P. & B. Specimen without locality, H.

*Gelidium coerulescens* Crouan. Port Antonio, July, 1891; July, 1900, P. & B. P. B.-A., No. 783.

By the kindness of Dr. Bornet this plant has been compared with authentic specimens from Guadeloupe, and it is the plant referred to by Mazé & Schramm, *Algues de Guadeloupe*, p. 199. Whether it is the

plant of Kuetzing, Tab. Phyc., Vol. XVIII. Pl. 56, from New Caledonia, is not certain.

*G. crinale* (Turn.) J. Ag. Port Antonio, July, 1900, with *G. coerulescens*, P. & B.

*G. rigidum* (Vahl) Ag. Port Antonio, July, 1891; Montego Bay, June, 1900, P. & B. P. B.-A., No. 784. Appears to be the form known as var. *radicans* (Bory) J. Ag.

*G. supradecompositum* Kuetz. Morant Bay, July, 1894, P. & B. No. 227, no locality, H.

The identification of this form is from a specimen from Fajardo, Puerto Rico, received from Hauck. If *G. crinale* were taken in a broad sense, it might include this form.

*Catenella Opuntia* var. *pinnata* (Harv.) J. Ag. Manchioneal, July, 1900, P. & B. Forming a thin greenish coating on small stones in shallow water, on muddy bottom near the mouth of a small river. P. B.-A., No. 792.

*Agardhiella tenera* (J. Ag.) Schmitz. Morant Bay, July, 1894; Montego Bay, June, 1900, P. & B.

*Solieria chordalis* (Ag.) J. Ag. Washed ashore, Port Antonio, July, 1891. P. & B.

*Eucheuma echinocarpum* Aresch. Montego Bay, a few small plants, June, 1900, P. & B.

*Gracilaria Blodgettii* Harv. Washed ashore, Montego Bay, June, 1900, P. & B.; only a few specimens, some of which show a tendency to pass into *G. confervoides*.

*G. caudata* J. Ag. Port Antonio, Aug., 1894, P. & B.

*G. cervicornis* (Kuetz.) J. Ag. Washed ashore, Morant Bay, July, 1894; Manchioneal, July, 1900, P. & B. Near Kingston, Duerden. P. B.-A., No. 787. Some of the plants are quite like Mediterranean specimens of *G. armata*. The Florida plant described as *G. armata* by Harvey in the *Nereis Boreali-Americana* seems to be different, and has not been found in Jamaica.

*G. compressa* (Ag.) Grev. Annotto Bay, Aug., 1894, P. & B.

*G. confervoides* (L.) Grev. On small stones, St. Ann's Bay, March 23, 1893, No. 312, H. Washed ashore, Borden, July, 1894; Montego Bay, Manchioneal, 1900, P. & B. Near Kingston, Duerden. Common and variable.

*G. cornea* J. Ag. Washed ashore, Rio Bono, June, 1900, P. & B.

*G. Curtissiae* J. Ag. Washed ashore, Annotto Bay, Aug., 1894, P. & B.

*G. damaecornis* J. Ag. Annotto Bay, Aug., 1894; Manchioneal, July, 1900, P. & B. P. B.-A., No. 788.

*G. divaricata* Harv. In short tufts, Navy Island, Port Antonio, March, 1893, Nos. 155 and 228, H. Port Antonio, July, 1891; Port Morant, Rio Bono, June, 1900, P. & B. P. B.-A., No. 789. Generally distributed but nowhere common.

*G. Domingensis* Sond. Manchioneal, June, 1900, P. & B. Found only in a very limited station, in large tufts on rocks about one meter depth, in rough water; very luxuriant plants, showing beautiful shades of violet.

By J. G. Agardh this is considered as merely a form of *G. multipartita* var. *polycarpa*. Imperfectly developed specimens have some resemblance to that variety, but well developed plants are quite different; the habit reminds one rather of *Laurencia pinnatifida*. All three kinds of fruit were found in the Manchioneal specimens, the cystocarps and tetraspores as usual in this genus, the antheridia in crypts, as described by Thuret for *G. confervoides*. The description of *G. Krugiana* in Hauck's Puerto Rico list is quite suggestive of some of these specimens.

*G. ferox* J. Ag. Washed ashore, Morant Bay, July, 1894, P. & B.

*G. multipartita* (Clem.) J. Ag. Port Antonio, July, 1891; Port Morant, Montego Bay, Ora Cabessa, Manchioneal, 1900, P. & B. No. 380, no locality, H. Near Kingston, Duerden. Chitty. P. B.-A., No. 885.

*G. Wrightii* (Turn.) J. Ag. Annotto Bay, Aug., 1894; Montego Bay, June, 1900, P. & B. A few plants only.

The fresh frond is very stout and densely branched, and not at all compressed; it shrinks much in drying, and herbarium specimens give the idea of a flattened frond.

*Hypnea divaricata* Grev. In large tufts on rocks in shallow water, Montego Bay, Manchioneal, 1900, P. & B.

*H. musciformis* (Wulf.) Lamour. On stones at tide mark, Port Antonio, March, 1893, Nos. 147 and 223; St. Ann's Bay, March 24, 1893, No. 320, H. Near Kingston, Duerden. Common everywhere, P. & B. Chitty.

*H. Valentiae* (Turn.) Mont. Annotto Bay, Aug., 1894, P. & B.

The species is here taken in the same sense as by Hauck, Hedwigia, 1887, Heft 1, to include *H. nidifica* J. Ag. and *H. fruticulosa* Kuetz.; forms corresponding to both of these occur at Annotto Bay.

*Cordylecladia irregularis* Harv. Annotto Bay, Aug., 1894, P. & B. Near Kingston, Duerden.

Some of the plants from each locality have tetraspores, which appear not to have been previously reported. They are arranged much as in *C. erecta*, except that they are at the ends of short lateral branches, instead of terminal on the larger branches; the modified portions of the branches being ovate or subspherical rather than lanceolate. One of the Kingston specimens has cystocarps, which are spherical and external on the branches, as in other species of the genus.

*Cordylecladia Peasiae* n. sp. Fronds slender, filiform, arising from a more or less distinct crustaceous base, dichotomously divided, with occasional scattered or secund ramuli, usually quite short. Tetraspores cruciate, in the somewhat swollen and darkened tips of the branches and ramuli, immersed in the cortical layer. Cystocarps globular, sessile along the main branches. Color purplish brown, changing into whitish or greenish; substance rigid.

Somewhat resembles *C. erecta*, which is, however, a smaller plant, much less branched, and having the receptacles for tetraspores larger and of different shape. *C. conferta* and *C. Andersoniana* have the tetraspores in densely tufted special lateral branches. *C. irregularis* is stouter, with hollow stems and with oval or subspherical lateral branches for the tetraspores. In *C. furcellata* the tetraspores are borne in branches resembling the vesicles of *Chrysomenia uvaria*. *C. heteroclada* has a flat frond, and *C. Huntii* is unrecognizable from the description of Harvey.

Manchioneal, July, 1900, P. & B. P. B.-A., No. 791.

*Chrysomenia halymenioides* Harv. Washed ashore, Morant Bay, July, 1894, P. & B.

*Champia parvula* (Ag.) Harv. Montego Bay, Port Maria, 1900, P. & B.

*Caloglossa Leprieurii* (Mont.) J. Ag. Among *Bostrychia*, just above water level, Port Antonio, July, 1900, P. & B.

*Asparagopsis Delilei* (Ag.) Lamour. In tree-like tufts, Navy Island, March 10, 1893, H.

*Laurencia cervicornis* Harv. Annotto Bay, Aug., 1894; washed ashore, Fingston, July, 1900, P. & B.

*L. implicata* J. Ag. Morant Bay, July, 1900, P. & B.

*L. obtusa* (Huds.) Lamour. In tufts on rocks, Kingston Harbor, Apr. 8, 1893, No. 376; no locality, No. 224, H. Port Antonio, July, 1891; on rocks, Montego Bay, June, 1900, P. & B. Near Kingston, Duerden. Chitty.

*L. papillosa* (Forsk.) Grev. In tufts on rocks, Kingston Harbor, Apr. 8, 1893, H. Port Antonio, Kingston, Montego Bay, Manchioneal, Port

Maria, P. & B. Near Kingston, Duerden. Closely covering ledges in rather shallow water, also washed ashore. Chitty.

*L. perforata* Mont. Densely carpeting rocks in shallow water, Montego Bay, July, 1900, P. & B. P. B.-A., No. 794.

*L. tuberculosa* var. *gemmifera* (Harv.) J. Ag. Washed ashore, Morant Bay, Annotto Bay, 1894; Ora Cabessa, July, 1900, P. & B.

*Chondria Baileyana* Harv. Hope Bay, July, 1900, P. & B. No. 336, no locality, H.

*C. dasyphylla* (Woodw.) Ag. Washed ashore, Port Antonio, July, 1891; Montego Bay, June, 1900, P. & B.

*C. tenuissima* (Good. & Woodw.) Ag. Washed ashore, on sandy beach, Montego Bay, June, 1900, P. & B.

*Acanthophora Thierii* Lamour. Common on rocks in Kingston Harbor, Port Maria, Nos. 176, 195, 278, 377, H. Port Antonio, July, 1891, P. & B. Near Kingston, Duerden.

*Digenea simplex* (Wulf.) Ag. In tufts on rocks, Port Maria, March 16, 1893, No. 252; on stones in shallows, St. Ann's Bay, March 30, 1893, No. 334, H. Washed ashore, Orange Bay, 1894; Manchioneal, July, 1900, P. & B. Near Kingston, Duerden.

*Polysiphonia cuspidata* J. Ag. In tufts on piles at beach, Port Maria, March 16, 1893, No. 251; on stones in shallow water, St. Ann's Bay, March 30, 1893, No. 335, H. Port Antonio, Aug., 1894, covering rocks in shallow water; Manchioneal, Port Morant, 1900, P. & B.

*P. ferulacea* Suhr. In dense tufts on rocks and eel-grass, Rio Novo, June, 1900, P. & B. Near Kingston, Duerden, a slender, long-jointed form.

*P. Havanensis* Mont. On mangrove roots, Port Antonio, March 8, 1893, No. 214; on other algae, Kingston Harbor, Apr. 8, 1893, Nos. 374b, 375, H. Washed ashore, Montego Bay, Port Antonio, 1900, P. & B. Near Kingston, Duerden.

*P. Havanensis* var. *Binneyi* (Harv.) J. Ag. Port Antonio, July, 1891, P. & B.

*P. Pecten-Veneris* Harv. On other Florideae, Port Maria, March 17, 1893, No. 276, H.

*P. secunda* (Ag.) Zan. On other algae, Kingston Harbor, Apr. 8, 1893, No. 374, H. Washed ashore, Borden, Morant Bay, 1894, P. & B.

*P. subulata* (Duch.) J. Ag. Washed ashore, Montego Bay, June, 1900, P. & B.

Only two specimens collected of this species, which has not before



been reported from America. These agree well with specimens from the Mediterranean. The range of this species, as previously known, has been from the English Channel to Spain, the northern shore of the Mediterranean and the Adriatic.

*Lophosiphonia obscura* (Ag.) Falk. Covering stones in shallow water, Manchioneal, July, 1900, P. & B.

*Bryothamnion triangulare* (Gmel.) Kuetz. In great tufts in pools, Port Maria, March 16, 1893, Nos. 254 and 277, H. Washed ashore, Annotto Bay, Aug., 1894; Ora Cabessa, June, 1900, P. & B. Chitty. P. B.-A., No. 95.

*B. Seaforthii* (Turn.) Kuetz. Washed ashore, Port Antonio, July, 1891; Kingston, July, 1900, P. & B.

*Bostrychia tenella* (Vahl) J. Ag. Port Antonio, on rocks reached only by spray, July, 1891, and 1894; Manchioneal, similar locality, July, 1900, P. & B. P. B.-A., No. 796.

*B. Mazei* Crouan. In dense tufts on rock, Port Antonio, Feb. 23, 1893, No. 158, H.

*B. Moritziana* var. *intermedia* J. Ag. On rocks, shore of island, Port Antonio, Aug., 1894, P. & B.

"The *Bostrychias* grew upon rocks and ledges, usually above water, but dashed by spray."

*Murrayella pericladus* (Ag.) Schmitz. On mangrove roots, Port Antonio, March 8, 1893, No. 215; in dense tufts on wood, St. Ann's Bay, March 24, 1893, H. Manchioneal, July, 1900, P. & B. P. B.-A., No. 795.

*Amansia multifida* Lamour. Washed ashore, Morant Bay, Annotto Bay, July, 1894; Rio Bono, Rio Novo, Kingston, 1900, P. & B. P. B.-A., No. 94. P. U., No. 708.

*Dasya arbuscula* (Dillw.) Ag. Washed ashore, Montego Bay, July, 1900, P. & B.

*D. Gibbsii* Harv. Washed ashore, Port Antonio, Aug., 1894, P. & B.

*D. mucronata* Harv. Washed ashore, Morant Bay, July, 1894, P. & B.

*Heterosiphonia Wurdemanni* (Bailey) Falk. On *Gelidium rigidum*, No. 276, H. Annotto Bay, Aug., 1894, P. & B.

*Dictyurus occidentalis* J. Ag. Annotto Bay, Aug., 1894; Kingston, near the lighthouse, July, 1900, P. & B. Always washed ashore, never in large quantity, usually only a fragment here and there. P. B.-A., No. 797.



*Halodictyon mirabile* Zan. Washed ashore, St. Ann's Bay, March 30, 1893, H.

*Spermothamnion Gorgoneum* (Mont.) Bornet. On *Codium tomentosum*, Port Antonio, Aug., 1894; Kingston, July, 1900, P. & B. Port Antonio, Feb. 27, 1893, No. 175 a, H. P. B.-A., No. 441.

"Both cystocarps and polyspores have been found in Jamaica specimens; in the former the spores have thick cell walls and are arranged as in *Spermothamnion*; the involucre is only slightly developed. The polyspores are quite numerous, in an ovate or subspherical mass, occupying not more than half the diameter of the large, hyaline sporangium." Note from label of P. B.-A., No. 441.

*S. Turneri* var. *variabile* J. Ag. On *Bryothamnion Seaforthii*, Kingston, July, 1900, P. & B.

*Callithamnion byssoideum* var. *Jamaicensis* Collins. In dense tufts on rocks, Port Antonio, Feb. 27, No. 170, H. P. B.-A., No. 443.

"This plant has the divided cystocarps, with conical lobes, characteristic of *C. byssoideum*; antheridia and tetraspores also agree; but the habit is strikingly different, everything being condensed, the branches relatively shorter and stouter, and very densely set, the terminal ramuli often arranged more like *C. corymbosum*. It may possibly be the same as *C. Hypneae* Crouan in Mazé & Schramm, Algues de Guadeloupe; the name must be considered as provisional, awaiting comparison with authentic specimens of the latter." Note from the label of P. B.-A., No. 443.

*C. corymbosum* (Eng. Bot.) Lyng. On *Codium tomentosum*, Port Antonio, Aug., 1894, P. & B.

*Haloplegma Duperryi* Mont. Washed ashore, Morant Bay, Annotto Bay, Orange Bay, 1894; Kingston, July, 1900, P. & B. Only a few fragments at each place.

*Crouania attenuata* (Bonnem.) J. Ag. On *Cryptonemia crenulata*, Morant Bay, July, 1894, P. & B. In small tufts, Navy Island, March 10, 1893, H.

*Antithamnion Butleriae* n. sp. Fronds erect, ecorticate, simple or with a few branches, which may be dichotomous, alternate, or occasionally opposite, diameter near base about  $30\mu$ , cells 3-6 diameters, walls thick. The lower portion of the frond or branch is naked; above that each cell bears normally a pair of ramuli, issuing at about two-thirds the height of the cell; the lowest ramuli are simple, subulate, of from two to six cells about as long as broad; sometimes by the suppression of a ramulus the branching is apparently alternate; farther up the frond these

ramuli are compounded with similar smaller subulate ramelli, appearing first on the lower side of the ramulus. The upper pinnae have from each cell of the rachis a pair of ramelli which touch each other laterally, so that the pinna forms a continuous triangle. At the tips of the branches the cells are much shorter than those below, and the triangular compound pinnae are in contact, giving a linear outline to the whole. Color a rich rose. On *Bryothamnion Seaforthii*, Kingston, July, 1900, P. & B.

From *A. pteroton* (Schousb.) Bornet it differs in the more densely branched pinnae, with ramelli on both sides, or on the lower only. From *Ptilothamnion micropterum* (Mont.) Bornet it differs by the absence of the apparent bifurcation of the pinna. *Callithamnion microptilum* Grunow has much shorter articulations in the main branches, and less dense pinnules, which also are alternately more and less developed, as in some species of *Ptilota*. In the absence of fruit it is impossible to determine that the plant in question may not, when fruit is found, have to rather bear the name of *Ptilothamnion Butleriae*.

*Spyridia aculeata* Kuetz. Washed ashore, St. Ann's Bay, March 30, 1893, No. 337; in tufts, Port Antonio, March 10, 1893, No. 228, H.

*S. filamentosa* (Wulf.) Harv. In dense tufts, Port Antonio, March 10, 1893, No. 222, H. Port Morant, Kingston, Montego Bay, Manchioneal, P. & B. Probably common everywhere. Chitty.

*Ceramium byssoideum* Harv. Washed ashore, Port Antonio, July, 1891, P. & B.

*C. clavulatum* Ag. Port Maria, Nos. 275 and 301; Port Antonio, No. 183, H. Morant Bay, Manchioneal, Kingston, Montego Bay, P. & B. Common everywhere and very variable.

*C. fastigiatum* Harv. Washed ashore, Port Antonio, July, 1891; Ora Cabessa, Rio Bono, Rio Novo, June, 1900.

*C. gracillimum* Harv. On rocks, Apostles Battery, Kingston Harbor, Apr. 10, 1893, H.

*C. nitens* (Ag.) J. Ag. Washed ashore, Port Antonio, July, 1891; Manchioneal, Montego Bay, 1900, P. & B.

*C. tenuissimum* (Lyng.) J. Ag. On eel-grass, St. Ann's Bay, March 24, 1893, No. 318, H. Port Antonio, July, 1891; Manchioneal, Montego Bay, 1900, P. & B. P. B.-A., No. 798. The Montego Bay specimens are small, connecting the type with the following variety.

*C. tenuissimum* var. *pygmaeum* (Kuetz.) Hauck. On *Laurencia obtusa*, near Kingston, Duerden. P. B.-A., No. 896. A very small form, hardly visible to the naked eye, but in full tetrasporic fruit.

*Halymenia Floresia* (Clem.) Ag. Washed ashore, Montego Bay, June, 1900, P. & B.

*Grateloupia filicina* (Wulf.) Ag. Morant Bay, on rocks washed by the waves, but not really under water, July, 1894; Rio Bono, Rio Novo, July, 1900, P. & B. In tufts on wood, St. Ann's Bay, March 24, No. 419; Kingston Harbor, Apr. 8, 1893, No. 381, H.

"The *Grateloupia* gathered in 1900 was lying in coarse, black, dry, rigid tangle on the beach, totally unlike the *Grateloupia* found in 1894 at Morant Bay, growing on a big boulder on shore washed by heavy surf. At the latter locality, when the water was over the plants they floated out like fine, greenish-brown hair; as the water receded the plants fell back on to the rock, covering it like a soft jelly. From the habit of the two forms, one would never suspect that they were the same species."

*G. dichotoma* J. Ag. Near Kingston, Duerden. Fronds broader than usual in this species as found in the Mediterranean or at the Canaries, but otherwise the same.

*G. prolongata* J. Ag. Near Kingston, Duerden. Agreeing well with Agardh's description, and with the form from California which passes under this name.

*Cryptonemia crenulata* J. Ag. Morant Bay, Annotto Bay, and coast towards Port Antonio, washed ashore and growing on "sea-fans," July and Aug., 1894; Kingston, July, 1900, P. & B.

*Cruoriella Armoria* Crouan. On stones and shells, Annotto Bay, July, 1891, P. & B.

*Peysonnellia Dubyi* Crouan. On corals, Port Maria, March 17, No. 283; Port Antonio, Feb. 23, 1893, No. 161, H.

*P. rubra* (Grev.) J. Ag. On rocks, Port Maria, March 19, 1893, No. 291, H.

*Hildenbrandia Prototypus* Nardo. On coral rock, Port Antonio, Feb. 23, 1893, No. 161; Port Maria, March 20, 1893, No. 300, H.

*Melobesia farinosa* Lamour. On *Dictyota*, etc., Port Antonio, July, 1891, P. & B. On various algae, near Kingston, Duerden.

*M. Lejolisii* Rosanoff. On various algae and eel-grass, P. & B.

*M. membranacea* Lamour. On various algae, P. & B.

*M. pustulata* Lamour. On *Gracilaria Domingensis*, P. & B.

*Lithothamnion incrustans* Phil. On rocks, Port Maria, March 16, 1893, No. 258, H. Montego Bay, July, 1900, P. & B.

*L. Lenormandi* (Aresch.) Foslie. On shells, Port Antonio, P. & B.

*Amphiroa charoides*, Lamour. Port Antonio, July, 1891, P. & B. In tufts on bottom, Port Antonio, March 2, 1893, H.

*A. debilis* Kuetz. Port Antonio, July, 1891, P. & B. In tufts on rocks, Port Antonio, Feb. 27, No. 177; Kingston Harbor, Apr. 8, 1893, No. 382, H. Near Kingston, Duerden.

*A. fragilissima* Lamour. Growing like a moss on coral reef and sand near shore, in shallow water, Port Antonio, July, 1891, P. & B.

Murray gives this species on authority of a specimen by Sloane, but as he also refers to Farlow, Anderson & Eaton, No. 15, it is probable that Sloane's specimen is rather *A. debilis*. The plant distributed under No. 15 was originally labelled *A. fragilissima*, but a revised label was afterwards issued, as *A. debilis*.

*Corallina capillacea* Harv. Annotto Bay, Aug., 1894, P. & B. In dense tufts, Kingston Harbor, Apr. 8, No. 383; Port Maria, March 17, 1893, H. P. B.-A., No. 150.

*C. Cubensis* Mont. Annotto Bay, Aug., 1894, P. & B. In dense tufts, Port Maria, March 16, 1893, No. 256, H.

*C. pumila* (Lamour.) Kuetz. On *Turbinaria trialata*, Port Antonio, July, 1891; on *Stypopodium lobatum*, Montego Bay, June, 1900, P. & B. P. B.-A., No. 799.

*C. rubens* L. In dense tufts, Port Maria, March 16, 1893, No. 257, H. On rocks, Port Morant, July, 1900, P. & B. P. B.-A., No. 800. Sloane. Chitty.

*C. subulata* Ell. & Sol. Kingston, Feb., 1896, O. Hansen. Sloane.

TABLE I.

COMPARISON OF MARINE FLORAS OF JAMAICA AND OTHER REGIONS.

	Puerto Rico.	Canaries.	Morocco.	Biscay.	Great Britain.	New England.
<b>CLASS SCHIZOPHYCEAE.</b>						
Family <b>Chroococcaceae.</b>						
<i>Chroococcus turgidus</i> . . . . .						+
<i>Chroothoece Richteriana</i> . . . . .						
Family <b>Chamaesiphonaceae.</b>						
<i>Xenococcus Schousboei</i> . . . . .			+	+	+	+
Family <b>Hormogoneae.</b>						
<i>Oscillatoria Corallinae</i> . . . . .				+	+	+
<i>Lyngbya aestuarii</i> . . . . .	+		+		+	+
<i>confervoides f. violacea</i> . . . . .						
<i>majuscula</i> . . . . .	+	+	+	+	+	+
<i>Symploca hydroides</i> . . . . .		+	+		+	+
" var. <i>fasciculata</i> . . . . .						
<i>Microcoleus chthonoplastes</i> . . . . .					+	+
<i>tenerrimus</i> . . . . .						
<i>Hormothamnion enteromorphoides</i> . . . . .		+				
<i>Scytonema conchophilum</i> . . . . .						
<i>Mastigocoleus testarum</i> . . . . .				+	+	+
<i>Calothrix aeruginea</i> . . . . .					+	+
<i>confervicola</i> . . . . .		+	+	+	+	+
<i>Contarenii</i> . . . . .				+		
<i>pilosa</i> . . . . .						
<i>Dichothrix penicillata</i> . . . . .						
<b>CLASS CHLOROPHYCEAE.</b>						
Family <b>Ulvaceae.</b>						
<i>Ulva fasciata</i> . . . . .						
<i>Lactuca var. rigida</i> . . . . .		+	+	+	+	+
<i>Enteromorpha erecta</i> . . . . .			+		+	+
<i>flexuosa</i> . . . . .			+			
<i>intestinalis</i> . . . . .		+	+	+	+	+
<i>prolifera</i> . . . . .	+		+		+	+
Family <b>Chaetophoraceae.</b>						
<i>Diplochaete solitaria</i> . . . . .						
Family <b>Mycoideaceae.</b>						
<i>Pringsheimia scutata</i> . . . . .					+	+

TABLE I. — continued.

	Puerto Rico.	Canaries.	Morocco.	Ricay.	Great Britain.	New England.
<b>Family Cladophoraceae.</b>						
<i>Chaetomorpha brachygonia</i> . . . . .	+					
<i>clavata</i> . . . . .		+	+	+	+	+
<i>aerea</i> . . . . .		+	+		+	+
<i>Linum</i> . . . . .	+	+	+		+	+
" <i>var. brachyarthra</i> . . . . .						
<i>Melagonium f. typica</i> . . . . .					+	+
<i>Cladophora crystallina</i> . . . . .		+			+	
<i>fascicularis</i> . . . . .	+					
<i>fuliginosa</i> . . . . .			+	+	+	+
<i>Hutchinsiae</i> . . . . .						
<i>intertexta</i> . . . . .					+	
<i>trichocoma</i> . . . . .						
<b>Family Gomontiaceae.</b>						
<i>Gomontia polyrhiza</i> . . . . .				+	+	+
<b>Family Bryopsidaceae.</b>						
<i>Bryopsis Harveyana</i> . . . . .						
<i>pennata</i> . . . . .						
<b>Family Caulerpaceae.</b>						
<i>Caulerpa cupressoides var. typica</i> . . . . .						
" <i>var. Turneri</i> . . . . .						
" <i>var. mamilliosa</i> . . . . .						
" <i>var. ericifolia</i> . . . . .						
<i>pinnata f. Mexicana</i> . . . . .	+					
<i>plumaris f. longiseta</i> . . . . .	+					
" <i>f. brevipes</i> . . . . .						
<i>prolifera</i> . . . . .		+	+			
<i>racemosa var. clavifera</i> . . . . .		+				
" " <i>f. macrophysa</i> . . . . .						
<i>taxifolia</i> . . . . .	+					
<i>verticillata</i> . . . . .						
" <i>f. charoides</i> . . . . .						
<b>Family Codiaceae.</b>						
<i>Penicillus capitatus</i> . . . . .	+					
<i>dumetosus</i> . . . . .	+					
<i>Rhypocephalus Phoenix</i> . . . . .						
<i>Avrainvillea longicaulis</i> . . . . .						
<i>nigricans</i> . . . . .						
<i>Udotea conglutinata</i> . . . . .						
<i>flabellata</i> . . . . .	+					
<i>Halimeda Opuntia</i> . . . . .	+					
<i>tridens</i> . . . . .	+					
<i>Tuna</i> . . . . .	+	+	+			
<i>Codium adhaerens</i> . . . . .	+	+	+	+	+	
<i>tomentosum</i> . . . . .	+	+	+	+	+	

TABLE I.—continued.

	Puerto Rico.	Canaries.	Morocco.	Biscay.	Great Britain.	New England.
<b>Family Valoniaceae.</b>						
<i>Valonia aegagropila</i> . . . . .		+				
<i>ventricosa</i> . . . . .						
<i>verticillata</i> . . . . .						
<i>Siphonocladus membranaceus</i> . . . . .		+				
<i>tropicus</i> . . . . .		+				
<i>Dictyosphaeria favulosa</i> . . . . .						
<i>Chamaedoris annulata</i> . . . . .		+				
<i>Microdictyon umbilicatum</i> . . . . .		+				
<i>Anadyomene stellata</i> . . . . .		+				
<b>Family Dasycladaceae.</b>						
<i>Acetabularia crenulata</i> . . . . .	+					
<i>Dasycladus clavaeformis</i> . . . . .		+	+			
<i>Botryophora occidentalis</i> . . . . .						
<i>Neomeris dumetosa</i> . . . . .						
<i>Cymopolia barbata</i> . . . . .	+	+				
<b>CLASS PHAEOPHYCEAE.</b>						
<b>Family Ectocarpaceae.</b>						
<i>Ectocarpus Mitchellae</i> . . . . .		+		+	+	+
<b>Family Striariaceae.</b>						
<i>Striaria attenuata</i> . . . . .					+	+
" <i>var. ramosissima</i> . . . . .						
<b>Family Encoeliaceae.</b>						
<i>Colpomenia sinuosa</i> . . . . .	+	+	+			
<i>Hydroclathrus cancellatus</i> . . . . .						
<b>Family Fucaceae.</b>						
<i>Turbinaria trialata</i> . . . . .	+					
<i>Sargassum bacciferum</i> . . . . .		+				+
<i>lendigerum</i> . . . . .						
<i>platycarpum</i> . . . . .	+					
<i>vulgare</i> . . . . .	+	+				
" <i>var. foliosissimum</i> . . . . .	+					
" <i>f. ovata</i> . . . . .						
<b>CLASS DICTYOTALES.</b>						
<b>Family Dictyotaceae.</b>						
<i>Spatoglossum Schroederi</i> . . . . .						
<i>Stypopodium lobatum</i> . . . . .	+	+				
<i>Gymnosorus variegatus</i> . . . . .		+				
<i>Padina Durvillaei</i> . . . . .	+					
<i>Dictyopteris delicatula</i> . . . . .	+					



TABLE I. — *continued.*

	Puerto Rico.	Canaries.	Morocco.	Bleary.	Great Britain.	New England.
<b>Family Dictyotaceae. — <i>continued.</i></b>						
Dictyopteris plagiogramma . . . . .	+					
Justii . . . . .	+					
Dictyota Bartayresiana . . . . .						
cervicornis . . . . .						
ciliata . . . . .						
dentata . . . . .	+					
dichotoma . . . . .		+	+	+	+	
divaricata . . . . .						
fasciola . . . . .		+				
Dilophus alternans . . . . .						
Guineensis . . . . .						
Dictyerpa Jamaicensis . . . . .						
<b>CLASS RHODOPHYCEAE.</b>						
<b>Family Bangiaceae.</b>						
Goniotrichum Humphreyi . . . . .						
elegans . . . . .			+	+	+	+
<b>Family Helminthocladiaceae.</b>						
Chantransia Saviana . . . . .		+				
Liagora Cheyneana . . . . .						
decussata . . . . .		+				
elongata . . . . .		+				
pulverulenta . . . . .		+				
valida . . . . .		+				
<b>Family Chaetangiaceae.</b>						
Galaxaura cylindrica . . . . .	+	+				
lapidescens . . . . .		+				
marginata . . . . .						
obtusata . . . . .	+					
rugosa . . . . .	+	+				
<b>Family Gelidiaceae.</b>						
Wrangelia Argus . . . . .		+				
Gelidium coerulescens . . . . .						
crinale . . . . .		+	+	+	+	+
rigidum . . . . .						
supradecompositum . . . . .	+					
Catenella Opuntia var. pinnata . . . . .						
<b>Family Rhodophyllidaceae.</b>						
Agardhiella tenera . . . . .	+					+
Solieria chordalis . . . . .			+	+		
Eucheuma echinocarpum . . . . .						

TABLE I.—continued.

	Puerto Rico.	Canaries.	Morocco.	Biscay.	Great Britain.	New England.
<b>Family Sphaerococcaceae.</b>						
<i>Gracilaria</i> Blodgettii . . . . .						
caudata . . . . .	+					
cervicornis . . . . .			+		+	
compressa . . . . .			+		+	
confervoides . . . . .	+	+	+	+	+	
cornea . . . . .						
Curtissiae . . . . .						
damaecornis . . . . .						
divaricata . . . . .						
Domingensis . . . . .						
ferox . . . . .						
multipartita . . . . .	+		+	+	+	+
Wrightii . . . . .	+					
<i>Hypnea</i> divaricata . . . . .						
musciformis . . . . .	+	+	+	+		+
Valentiae . . . . .						
<b>Family Rhodymeniaceae.</b>						
<i>Champia</i> parvula . . . . .	+	+	+	+	+	+
<i>Cordylecladia</i> irregularis . . . . .						
Peasiae . . . . .						
<i>Chrysomenia</i> halymenioides . . . . .						
<b>Family Delesseriaceae.</b>						
<i>Caloglossa</i> Leprieurii . . . . .	+					+
<b>Family Bonnemaisoniaceae.</b>						
<i>Asparagopsis</i> Delilei . . . . .		+				
<b>Family Rhodomelaceae.</b>						
<i>Laurencia</i> cervicornis . . . . .						
implicata . . . . .						
obtusa . . . . .		+	+	+	+	
perforata . . . . .		+				
papillosa . . . . .	+	+				
tuberculosa var. gemmifera . . . . .						
<i>Chondria</i> Baileyana . . . . .						+
dasyphylla . . . . .	+	+	+	+	+	+
tenuissima . . . . .		+	+	+	+	+
<i>Acanthophora</i> Thierli . . . . .	+					
<i>Digenia</i> simplex . . . . .						
<i>Polysiphonia</i> cuspidata . . . . .	+					
ferulacea . . . . .		+				
Havanensis . . . . .	+					
" var. Binneyi . . . . .						
<i>Pecten-Veneris</i> . . . . .						

TABLE I. — continued.

	Puerto Rico.	Canaries.	Morocco.	Biscay.	Great Britain.	New England.
<b>Family Rhodomelaceae. — continued.</b>						
<i>Polysiphonia secunda</i> . . . . .		+	+			
<i>subulata</i> . . . . .			+		+	
<i>Lophosiphonia obscura</i> . . . . .			+	+	+	
<i>Bryothamnion Seaforthii</i> . . . . .	+					
<i>triangulare</i> . . . . .	+					
<i>Bostrychia tenella</i> . . . . .						
<i>Mazei</i> . . . . .						
<i>Moritziana</i> var. <i>intermedia</i> . . . . .						
<i>Murrayella pericladus</i> . . . . .						
<i>Amansia multifida</i> . . . . .	+					
<i>Dasya arbuscula</i> . . . . .		+	+	+	+	
<i>Gibbesii</i> . . . . .						
<i>mucronata</i> . . . . .						
<i>Heterosiphonia Wurdemannii</i> . . . . .		+	+			
<i>Dictyurus occidentalis</i> . . . . .						
<i>Halodictyon mirabile</i> . . . . .			+			
<b>Family Ceramiaceae.</b>						
<i>Spermothamnion Gorgoneum</i> . . . . .		+				
<i>Turneri</i> var. <i>variabile</i> . . . . .		+	+	+	+	+
<i>Callithamnion byssoideum</i> var. <i>Jamaicensis</i> . . . . .		+		+	+	+
<i>corymbosum</i> . . . . .						
<i>Haloplegma Duperryi</i> . . . . .						
<i>Crouania attenuata</i> . . . . .			+		+	
<i>Antithamnion Butleriae</i> . . . . .						
<i>Spyridia aculeata</i> . . . . .			+			
<i>filamentosa</i> . . . . .	+	+	+	+	+	+
<i>Ceramium byssoideum</i> . . . . .						
<i>clavulatum</i> . . . . .	+	+	+			
<i>fastigiatum</i> . . . . .					+	+
<i>gracillimum</i> . . . . .			+	+	+	
<i>nitens</i> . . . . .						
<i>tenuissimum</i> . . . . .	+			+	+	+
" var. <i>pygmaeum</i> . . . . .	+					
<b>Family Grateloupiaceae.</b>						
<i>Halymenia Floresia</i> . . . . .		+	+			
<i>Grateloupia filicina</i> . . . . .	+		+	+	+	
<i>dichotoma</i> . . . . .		+	+	+	+	
<i>prolongata</i> . . . . .						
<i>Cryptonemia crenulata</i> . . . . .	+					
<b>Family Squamariaceae.</b>						
<i>Cruoriella Armórica</i> . . . . .						
<i>Peysonnellia Dubyi</i> . . . . .				+	+	
<i>rubra</i> . . . . .	+	+	+			

TABLE I. — *continued.*

	Puerto Rico.	Canaries.	Morocco.	Biscay.	Great Britain.	New England.
<b>Family Corallinaceae.</b>						
<i>Hildenbrandia Prototypus</i> . . . . .			+	+	+	+
<i>Melobesia farinosa</i> . . . . .	+	+		+	+	+
<i>Lejolisii</i> . . . . .				+	+	+
<i>membranacea</i> . . . . .	+	+	+	+	+	+
<i>pustulata</i> . . . . .		+		+	+	+
<i>Lithothamnion incrustans</i> . . . . .		+		+	+	
<i>Lenormandi</i> . . . . .				+		+
<i>Corallina capillacea</i> . . . . .						
<i>Cubensis</i> . . . . .						
<i>pumila</i> . . . . .	+					
<i>rubens</i> . . . . .	+	+	+	+	+	
<i>subulata</i> . . . . .	+					
<i>Amphiroa charoides</i> . . . . .						
<i>debilis</i> . . . . .						
<i>fragilissima</i> . . . . .	+					

TABLE II.

SUMMARY OF MARINE FLORAS, ARRANGED BY CLASSES.

	Jamaica.	Puerto Rico.	Canaries.	Morocco.	Biscay.	Great Britain.	New England.
Schizophyceae	19	2	7	24	34	66	75
Chlorophyceae	62	25	62	59	33	180	88
Phaeophyceae } Dictyotales }	29	16	61	75	80	103	118
Rhodophyceae	114	49	156	237	173	346	153
Total	224	92	286	395	320	735	434

TABLE III.  
PERCENTAGE BY CLASSES IN EACH FLORA.

	Jamaica.	Puerto Rico.	Canaries.	Morocco.	Biscay.	Great Britain.	New England.
Schizophyceae	8	2	3	6	11	9	17
Chlorophyceae	28	27	21	15	10	18	20
Phaeophyceae } Dictyotales }	13	17	21	19	25	26	26
Rhodophyceae	51	54	55	60	54	47	37

TABLE IV.  
COMMON TO JAMAICA IN OTHER FLORAS.

	Puerto Rico.	Canaries.	Morocco.	Biscay.	Great Britain.	New England.
Schizophyceae	2	4	5	6	9	10
Chlorophyceae	17	17	13	7	14	10
Phaeophyceae } Dictyotales }	11	8	2	2	3	3
Rhodophyceae	33	36	31	27	29	21
Total	63	65	51	42	55	44

TABLE V.  
PERCENTAGE OF JAMAICA FLORA COMMON TO OTHER FLORAS.

	Puerto Rico.	Canaries.	Morocco.	Biscay.	Great Britain.	New England.
Schizophyceae	11	22	26	32	47	53
Chlorophyceae	28	29	22	12	23	16
Phaeophyceae } Dictyotales }	38	27	7	7	10	10
Rhodophyceae	29	31	27	23	25	18
Total	28	30	23	19	25	19

TABLE VI.

PERCENTAGE OF OTHER FLORAS COMMON TO JAMAICA.

	Puerto Rico.	Canaries.	Morocco.	Biscay.	Great Britain.	New England.
Schizophyceae	100	57	21	18	14	13
Chlorophyceae	68	29	23	21	11	11
Phaeophyceae } Dictyotales }	69	13	3	3	2	3
Rhodophyceae	72	22	13	15	9	14
Total	69	24	14	11	8	10



